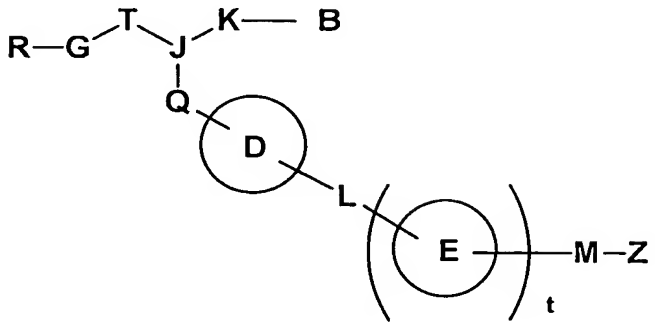
CLAIMS

1. A compound of formula (I):



(I)

wherein R represents an aliphatic hydrocarbon group which may be substituted, or a cyclic group which may have a substituent(s);

G represents a bond or a spacer having from 1 to 8 atoms in its principle chain;

T represents $-CH_2-$, or a spacer having one atom in its principle chain, the principle chain containing a hydrogen bond acceptable group which may have a substituent(s);

J represents a nitrogen atom or a carbon atom;

B represents an aliphatic hydrocarbon group which may be substituted, or a cyclic group which may have a substituent(s);

K represents (1) a bond, or (2) a spacer having from 1 to 8 atoms in its principle chain which may form a ring together with a substituent of the cyclic group in R, the ring D or a substituent on the ring D;

Q represents (1) a bond, or (2) a spacer having from 1 to 8 atoms in its principle chain which may form a ring together with the cyclic group in R, a substituent of the cyclic group in R or K;

ring D represents a cyclic group which may have an additional substituent(s);

L represents a bond, or a spacer having from 1 to 3 atoms in its principle chain;

ring E represents a cyclic group which may have an additional substituent(s);

M represents a bond, or a spacer having from 1 to 8 atoms in its principle chain;

A represents an acidic group; and

t represents 0 or 1, or

a salt thereof.

2. A prodrug of the compound according to claim 1.

3. The compound according to claim 1, wherein R is an aliphatic hydrocarbon group which may be substituted.

4. The compound according to claim 1, wherein R is a cyclic group which may have a substituent(s).

5. The compound according to claim 4, wherein the cyclic group is a C3-15 mono-, bi- or tricyclic carbocyclic group, a bicyclic carbocyclic group having a spiro bond or a bicyclic bridged carbocyclic group.

6. The compound according to claim 5, wherein the cyclic group is a C3-15 mono-, bi- or tricyclic aromatic carbocyclic group.

7. The compound according to claim 5, wherein the cyclic group is a cyclopentane, cyclopentene, cyclohexane, benzene or naphthalene ring.

8. The compound according to claim 6, wherein the cyclic group is a benzene ring.

9. The compound according to claim 4, wherein the cyclic group is a three- to fifteen-membered monocyclic, bicyclic or tricyclic heterocyclic group, a bicyclic heterocyclic group having a spiro bond or a bicyclic bridged heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

10. The compound according to claim 9, wherein the cyclic group is a three- to fifteen-membered monocyclic, bicyclic or tricyclic aromatic heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

11. The compound according to claim 9, wherein the cyclic group is a furan, isoxazole, thiophene, 1,2,3-thiadiazole, pyrrole, pyrazole, benzothiophene, indole, 1,3-dioxaindan, pyridine or cinnoline ring.

12. The compound according to claim 10, wherein the cyclic group is a pyridine ring.

13. The compound according to claim 1, wherein G is a bond.

14. The compound according to claim 1, wherein T is -CHOH-, or -CO-.

15. The compound according to claim 1, wherein J is a nitrogen atom.

16. The compound according to claim 1, wherein J is a carbon atom.

17. The compound according to claim 1, wherein K is a spacer having from 1 to 4 atoms in its principle chain.

18. The compound according to claim 17, wherein K is C1-4 alkylene which may be substituted.

19. The compound according to claim 18, wherein K is trimethylene, or trimethylene substituted with two halogen atoms.

20. The compound according to claim 1, wherein B is a C3-15 mono-, bi- or tricyclic carbocyclic group, a bicyclic carbocyclic group having a spiro bond or a bicyclic bridged carbocyclic group.

21. The compound according to claim 20, wherein B is a C3-15 mono-, bi- or tricyclic aromatic carbocyclic group.

22. The compound according to claim 20, wherein B is a cyclohexane, benzene, indan, tetrahydronaphthalene or naphthalene ring.

23. The compound according to claim 21, wherein B is a benzene ring.

24. The compound according to claim 1, wherein B is a three- to fifteen-membered monocyclic, bicyclic or tricyclic heterocyclic group, a bicyclic heterocyclic group having a spiro bond or a bicyclic bridged heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

25. The compound according to claim 24, wherein B is a three- to fifteen-membered monocyclic, bicyclic or tricyclic aromatic heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

26. The compound according to claim 24, wherein B is a pyrrolidine, piperidine, piperazine, morpholine, pyridine, thiazole, imidazole, pyrrole, pyrazole, indol or thiophene ring.

27. The compound according to claim 25, wherein B is a thiophene ring.

28. The compound according to claim 1, wherein Q is a spacer having from 1 to 4 atoms in its principle chain.

29. The compound according to claim 28, wherein Q is C1-4 alkylene which may be substituted.

30. The compound according to claim 29, wherein Q is methylene.

31. The compound according to claim 1, wherein ring D is a C3-15 mono-, bi- or tricyclic carbocyclic group, bicyclic carbocyclic group having a spiro bond or a bicyclic bridged carbocyclic group.

32. The compound according to claim 31, wherein ring D is a C3-15 mono-, bi- or tricyclic aromatic carbocyclic group.

33. The compound according to claim 31, wherein ring D is a cyclohexane or benzene ring.

34. The compound according to claim 32, wherein ring D is a benzene ring.

35. The compound according to claim 1, wherein ring D is a three- to fifteen-membered monocyclic, bicyclic or tricyclic heterocyclic group, a bicyclic heterocyclic group having spiro bond or a bicyclic bridged heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

36. The compound according to claim 35, wherein ring D is a three- to fifteen-membered monocyclic, bicyclic or tricyclic aromatic heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

37. The compound according to claim 35, wherein ring D is a piperidine, pyrrole, pyrazole, pyridine, 1,3,4-oxadiazole, thiazole, dihydrobenzoxazine or indol ring.

38. The compound according to claim 36, wherein ring D is a pyrrole or indol ring.

39. The compound according to claim 1, wherein L is a bond.

40. The compound according to claim 1, wherein L is a spacer having from 1 to 3 atoms in its principle chain.

41. The compound according to claim 40, wherein L is $-CH_2-$, -O-, -S-, -SO-, $-SO_2-$, or -NH-.

42. The compound according to claim 40, wherein L is -O- or -S-.

43. The compound according to claim 1, wherein ring E is a C3-15 mono-, bi- or tricyclic carbocyclic group, bicyclic carbocyclic group having a spiro bond or a bicyclic bridged carbocyclic group.

44. The compound according to claim 43, wherein ring E is a C3-15 mono-, bi- or tricyclic aromatic carbocyclic group.

45. The compound according to claim 44, wherein ring E is a benzene ring.

46. The compound according to claim 1, wherein ring E is a three- to fifteen-membered monocyclic, bicyclic or tricyclic heterocyclic group, a bicyclic heterocyclic group having spiro bond or a bicyclic bridged heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

47. The compound according to claim 46, wherein ring E is a three- to fifteen-membered monocyclic, bicyclic or tricyclic aromatic heterocyclic group containing from 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s).

48. The compound according to claim 46, wherein ring E is a piperidine, isoxazole, pyrazole, pyridine, thiazole, imidazole, thiophene, pyrrole or pyrrolidine ring.

49. The compound according to claim 1, wherein M is a bond.

50. The compound according to claim 1, wherein M is a spacer having from 1 to 4 atoms in its principle chain.

51. The compound according to claim 50, wherein M is C1-4 alkylene which may be substituted.

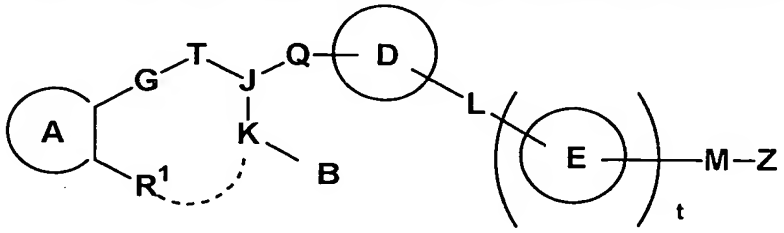
52. The compound according to claim 51, wherein M is methylene.

53. The compound according to claim 1, wherein Z is -$COOR^5$, in which R^5 represents a hydrogen atom, an aliphatic hydrocarbon group which may be substituted, or a cyclic group which may have a substituent(s).

54. The compound according to claim 53, wherein R^5 is a hydrogen atom, or C1-4 alkyl.

55. The compound according to claim 1, wherein Z is tetrazole.

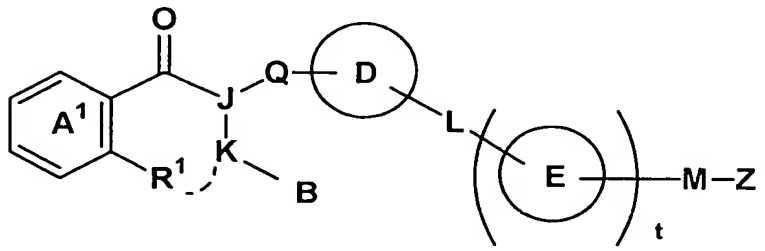
56. The compound according to claim 1, which is a compound of formula (I-J) in which K forms a ring together with a substituent of the cyclic group in R:



(I-J)

wherein ring A represents a cyclic group which may have a substituent(s) in R;
R^1 represents a substituent of the cyclic group in R; and
other symbols have the same meanings as described in claim 1.

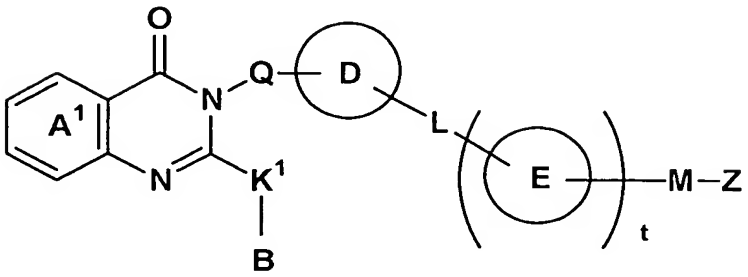
57. The compound according to claim 56, which is represented by formula (I-J-1):



(I-J-1)

wherein ring A^1 has the same meaning as the ring A described in claim 56, with the proviso that it represents a benzene ring which may have a substituent(s); and
other symbols have the same meanings as described in claim 1.

58. The compound according to claim 57, which is represented by formula (I-J-1-1):

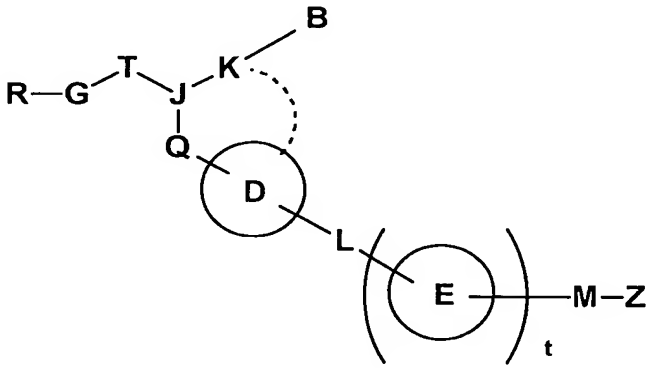


(I-J-1-1)

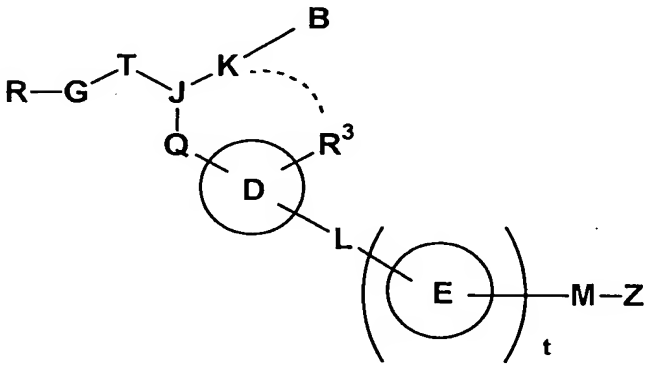
K^1 has the same meaning as K described in claim 1, with the proviso that it represents a spacer having from 1 to 7 atoms in its principle chain; and

other symbols have the same meanings as described in claim 1 or claim 57.

59. The compound according to claim 1, which is a compound of either formula (I-K) or formula (I-N) in which K forms a ring together with the ring D or a substituent on the ring D:



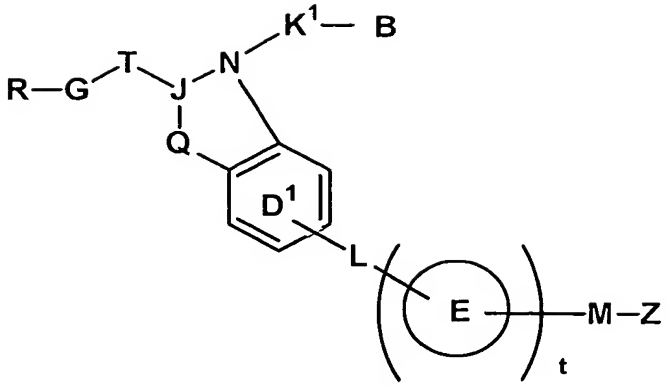
(I-K)



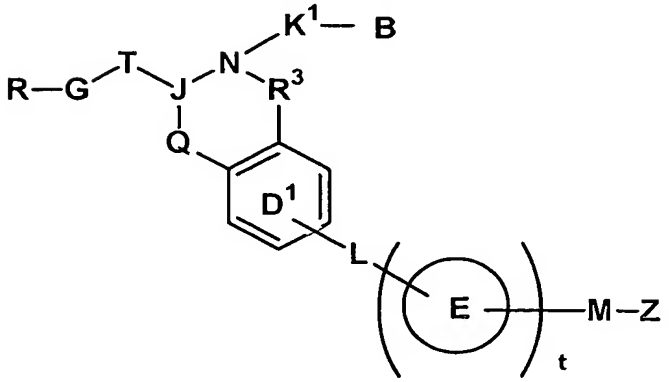
(I-N)

wherein all symbols have the same meanings as described in claim 1.

60. The compound according to claim 59, which is a compound of either following formula (I-K-1) or formula (I-N-1):



(I-K-1)



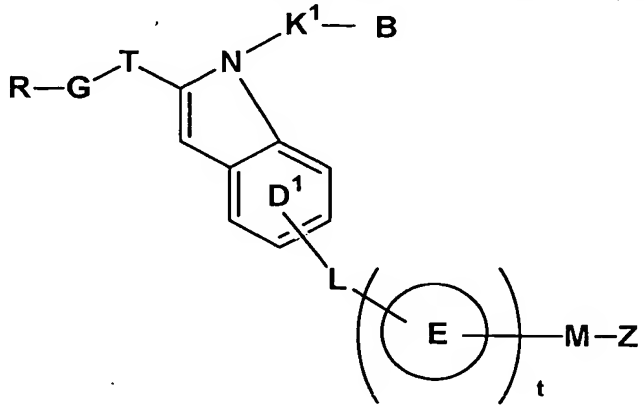
(I-N-1)

wherein ring D^1 has the same meaning as the ring D described in claim 1, with the proviso that it represents a benzene ring which may have a substituent(s);

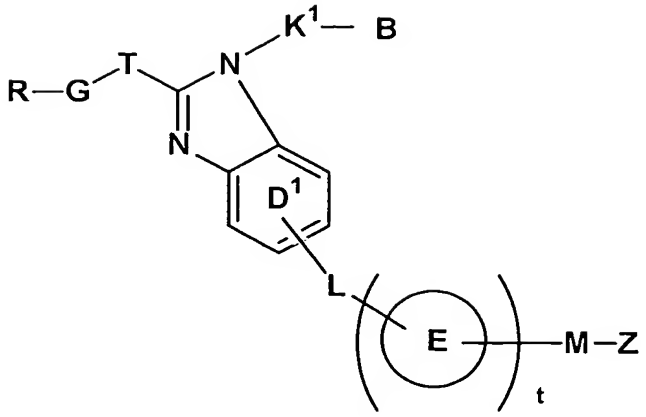
R^3 represents a substituent on the ring D; and

other symbols have the same meanings as described in claim 1 or claim 58.

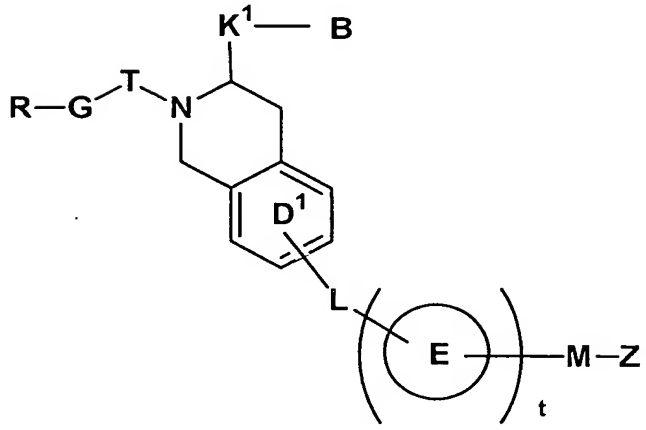
61. The compound according to claim 60, which is a compound of either following formula (I-K-1-1), formula (I-K-1-2) or formula (I-N-1-1):



(I-K-1-1)



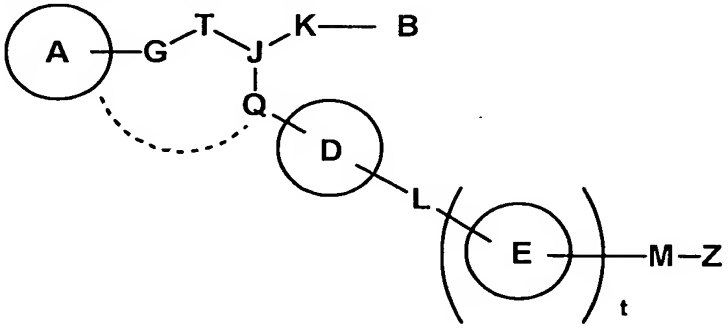
(I-K-1-2)



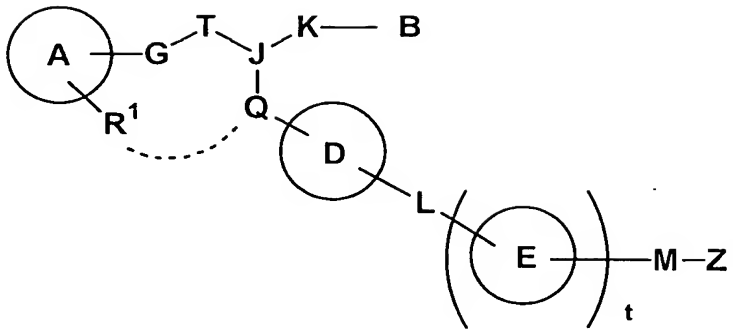
(I-N-1-1)

wherein all symbols have the same meanings as described in claim 1, claim 58 or claim 60.

62. The compound according to claim 1, which is a compound of either formula (I-L) or formula (I-O) in which Q forms a ring together with a cyclic group of R or a substituent of the cyclic group in R:



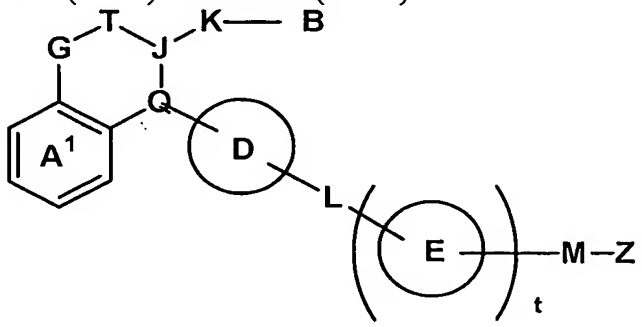
(I-L)



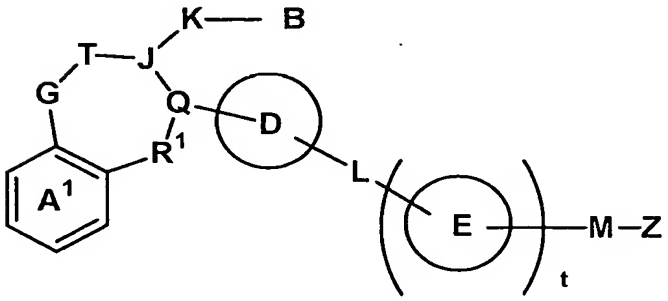
(I-O)

wherein all symbols have the same meanings as described in claim 1 or claim 56.

63. The compound according to claim 62, which is a compound of either following formula (I-L-1) or formula (I-O-1):



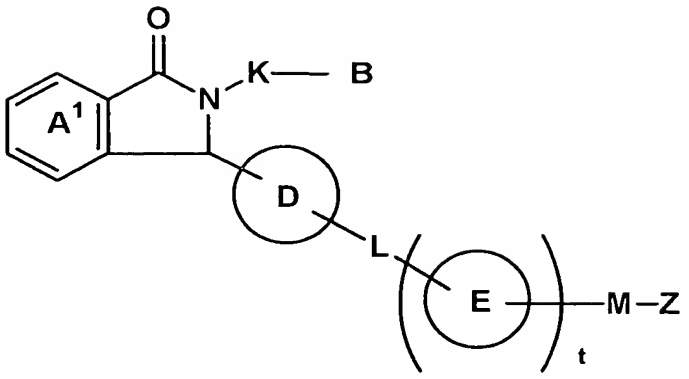
(I-L-1)



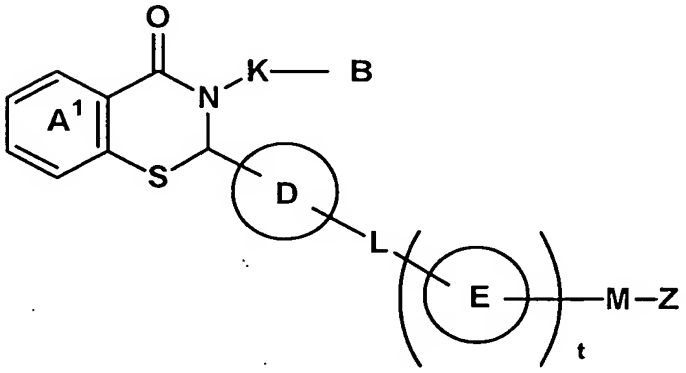
(I-O-1)

wherein all symbols have the same meanings as described in claim 1, claim 56 or claim 57.

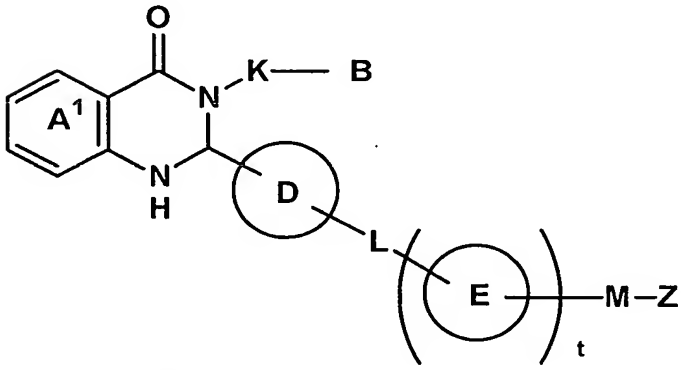
64. The compound according to claim 63, which is a compound of either following formula (I-L-1-1), formula (I-O-1-1), formula (I-O-1-2), formula (I-O-1-3), formula (I-O-1-4) or formula (I-O-1-5):



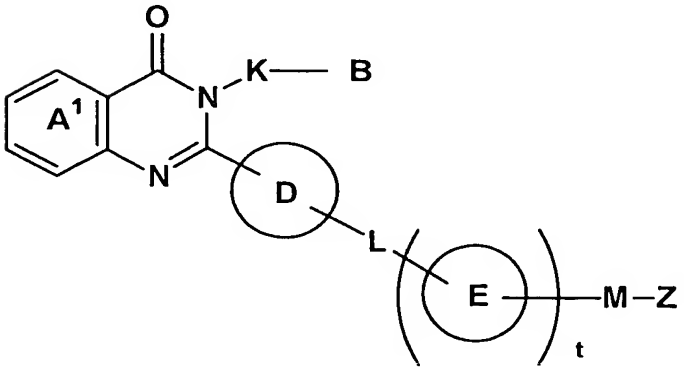
(I-L-1-1)



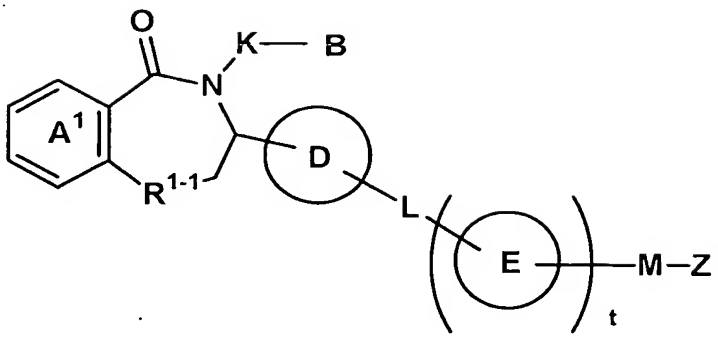
(I-O-1-1)



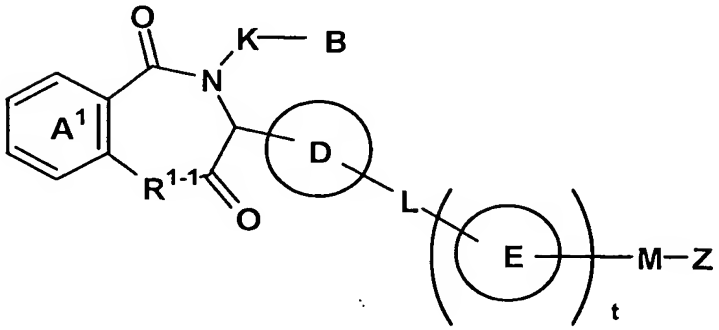
(I-O-1-2)



(I-O-1-3)



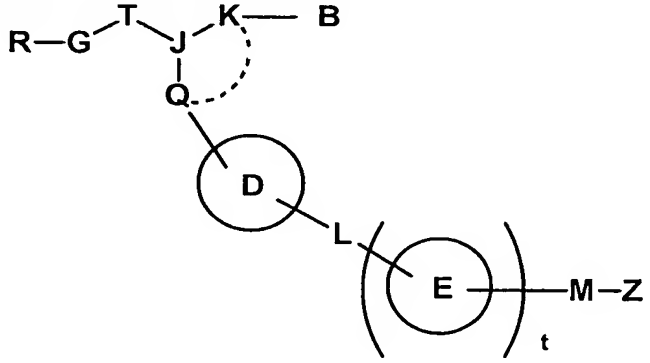
(I-O-1-4)



(I-O-1-5)

wherein R^{1-1} represents $-CH_2-$, -O-, -S- or -NH-; and
other symbols have the same meanings as described in claim 1 or claim 57.

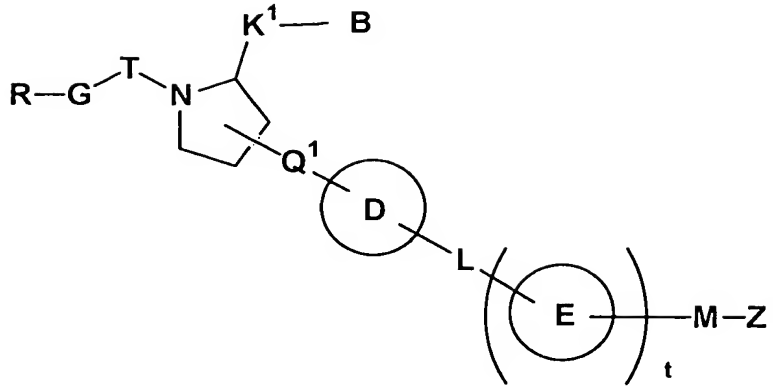
65. The compound according to claim 1, which is a compound of formula (I-M) in which Q forms a ring together with K:



(I-M)

wherein all symbols have the same meanings as described in claim 1.

66. The compound according to claim 65, which is represented by formula (I-M-1):

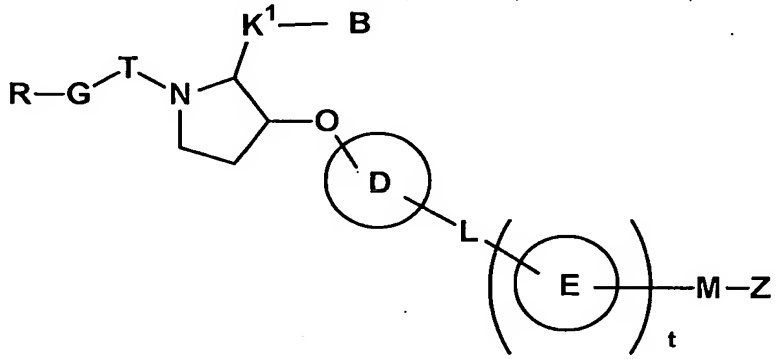


(I-M-1)

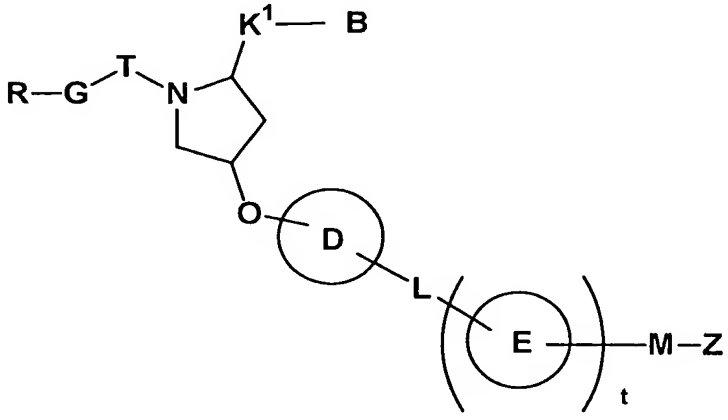
wherein Q^1 has the same meaning as Q described in claim 1, with the proviso that it represents a spacer having from 1 to 7 atoms in its principle chain; and

other symbols have the same meanings as described in claim 1 or claim 58.

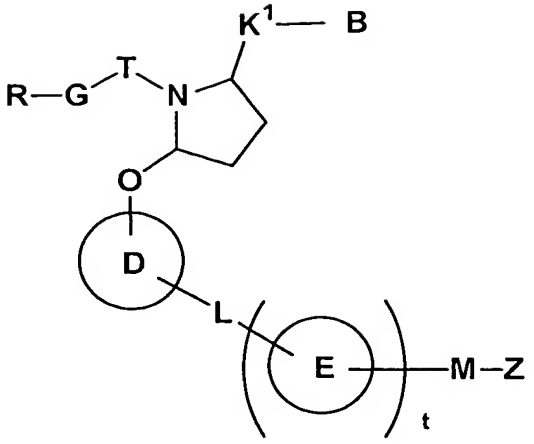
67. The compound according to claim 66, which is a compound of either following formula (I-M-1-1), formula (I-M-1-2) or formula (I-M-1-3):



(I-M-1-1)



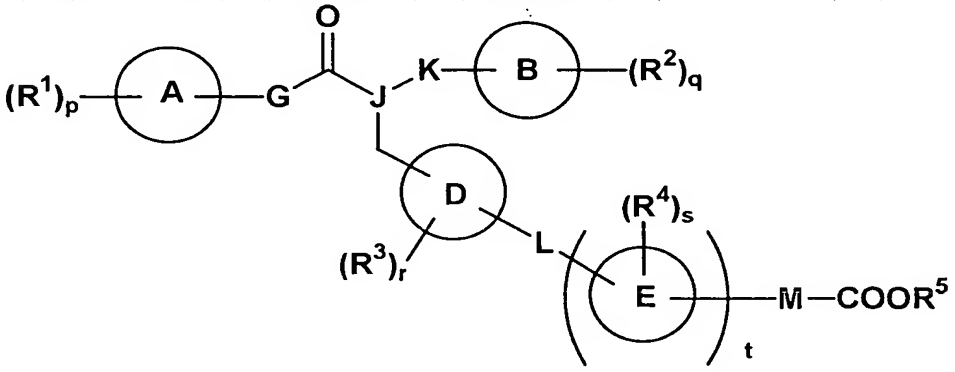
(I-M-1-2)



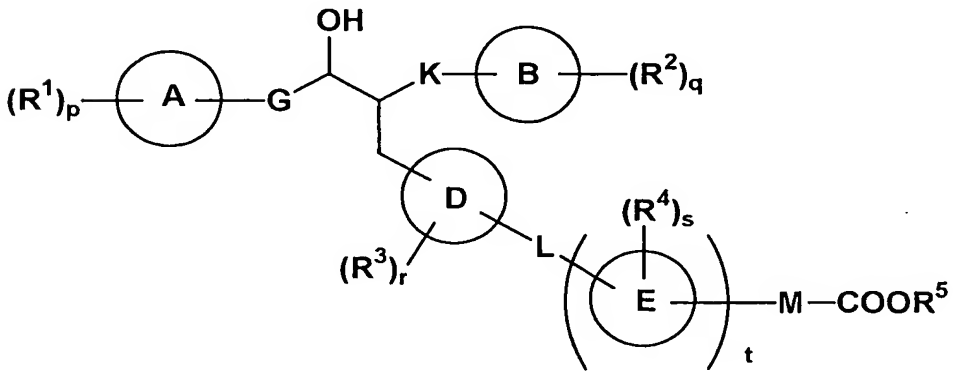
(I-M-1-3)

wherein all symbols have the same meanings as described in claim 1 or claim 58.

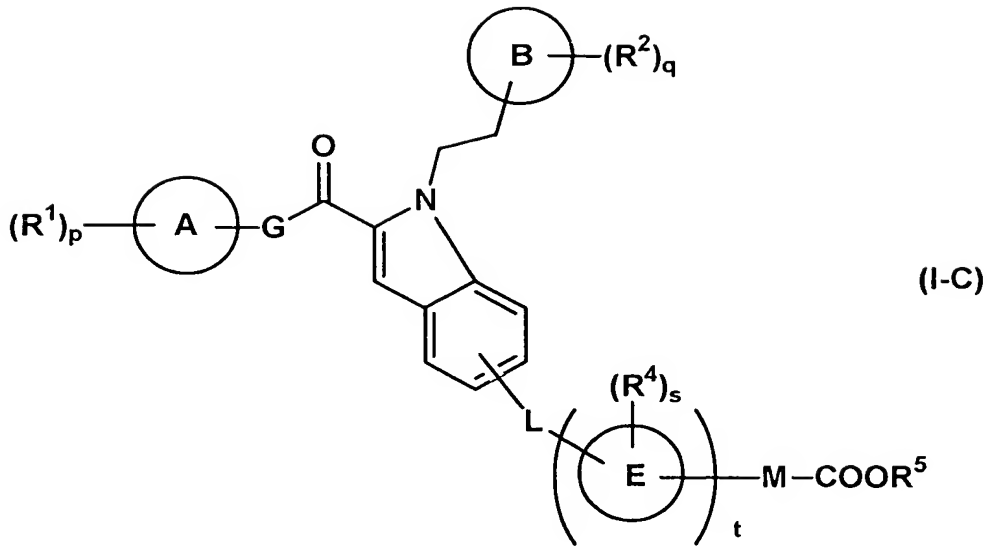
68. The compound according to claim 1, which is a compound of either following formula (I-A), formula (I-B), formula (I-C), formula (I-D) or formula (I-E):



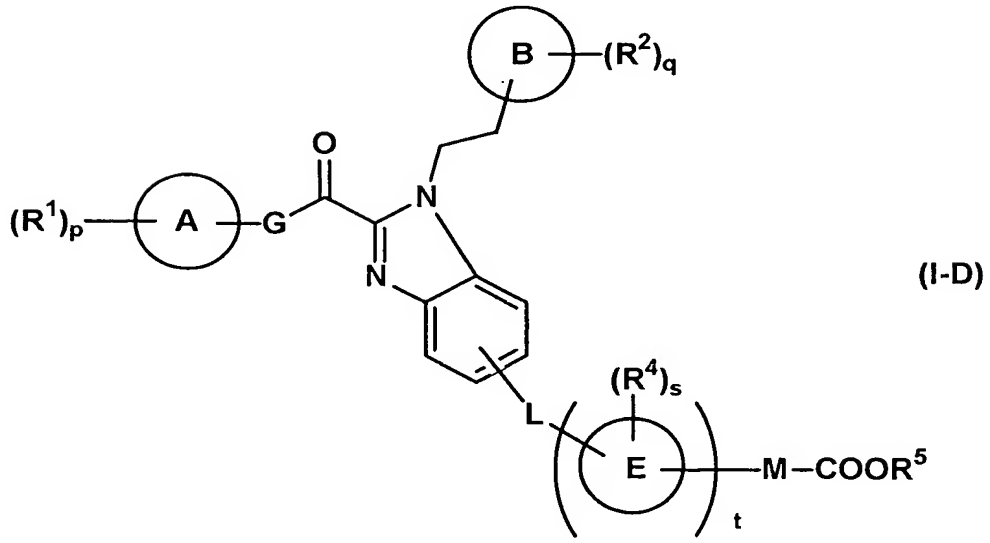
(I-A)



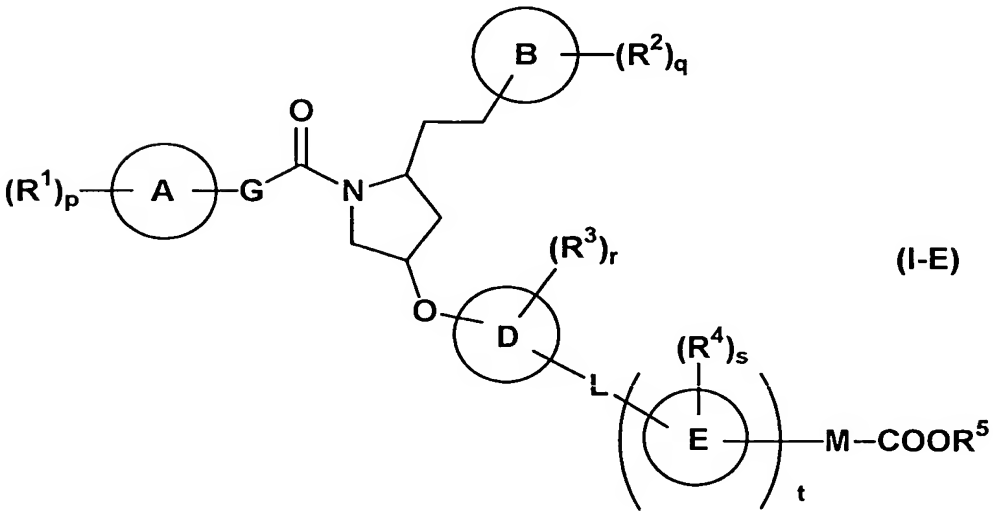
(I-B)



(I-C)



(I-D)



(I-E)

wherein R^1, R^2, R^3 and R^4 each independently represents (1) C1-8 alkyl, (2) C2-8 alkenyl, (3) C2-8 alkynyl, (4) a halogen atom, (5) trihalomethyl, (6) nitro, (7) cyano, (8) Cycl,

(9) $-OR^6$, (10) $-SR^7$, (11) $-NR^8R^9$, (12) $-CONR^{10}R^{11}$, (13) $-NR^{12}COR^{13}$, (14) $-SO_2NR^{14}R^{15}$, (15) $-NR^{16}SO_2R^{17}$, (16) $-SO_2R^{18}$, (17) $-COR^{19}$, (18) $-COOR^{20}$, or (19) C1-8 alkyl substituted with $-OR^6$, $-SR^7$, $-NR^8R^9$ or Cycl;

R^6 represents (1) a hydrogen atom, (2) C1-8 alkyl, (3) C2-8 alkenyl, (4) C2-8 alkynyl, (5) Cycl, (6) methyl substituted with 1 to 3 halogen, or (7) C1-8 alkyl substituted with Cycl;

R^7 to R^{16} and R^{20} each independently represents (1) a hydrogen atom, (2) C1-8 alkyl, (3) C2-8 alkenyl, (4) C2-8 alkynyl, or (5) Cycl;

R^{17}, R^{18} and R^{19} each independently represents (1) C1-8 alkyl, (2) C2-8 alkenyl, (3) C2-8 alkynyl, or (4) Cycl;

Cycl represents a C3-10 monocyclic or bicyclic carbocyclic group or a three- to ten-membered monocyclic or bicyclic heterocyclic group which contains 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s);

G, K and M each independently represents (1) a bond, (2) C1-8 alkylene, (3) C2-8 alkenylene, or (4) C2-8 alkynylene;

J represents a nitrogen atom or a carbon atom;

L represents a bond, an oxygen atom or a sulfur atom;

Ring A, ring B and ring D each independently represents a C3-10 monocyclic or bicyclic carbocyclic group or a three- to ten-membered monocyclic or bicyclic heterocyclic group which contains 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s);

Ring E represents a C3-7 monocyclic carbocyclic group or a three- to seven-membered monocyclic heterocyclic group which contains 1 to 5 hetero atoms selected from an oxygen atom(s), a nitrogen atom(s) and a sulfur atom(s);

p, q, r and s each independently represents 0 or an integer of from 1 to 5,

in which R^1s are the same or different when p represents 2 or more; R^2s are the same or different when q represents 2 or more; R^3s are the same or different when r represents 2 or more; and R^4s are the same or different when s represents 2 or more, respectively;

t represents 0 or 1; and

R^5 represents (1) a hydrogen atom, (2) C1-8 alkyl, (3) C2-8 alkenyl, or (4) C2-8 alkynyl, or

a salt thereof.

69. A pharmaceutical composition comprising the compound according to claim 1 or the prodrug according to claim 2.

70. The pharmaceutical composition according to claim 69, which is an LPA receptor antagonist.

71. The pharmaceutical composition according to claim 70, wherein the LPA receptor is EDG-2 receptor.

72. The pharmaceutical composition according to claim 71, which is an agent for prevention and/or treatment for urinary system disease.

73. The pharmaceutical composition according to claim 71, which is an agent for prevention and/or treatment for carcinoma-associated disease, proliferative disease, inflammation / immune system disease, disease caused by secretory dysfunction or brain-related disease.

74. A method for prevention and/or treatment of diseases referred from EDG-2, which comprises administering an effective amount of the compound according to claim 1 or a salt thereof to a mammal.

75. The method for prevention and/or treatment according to claim 74, wherein the disease referred from EDG-2 is urinary system disease.

76. The method for prevention and/or treatment according to claim 74, wherein the disease referred from EDG-2 is carcinoma-associated disease, proliferative disease, inflammation / immune system disease, disease caused by secretory dysfunction or brain-related disease.

77. Use of the compound according to claim 1 or a salt thereof for manufacture of a pharmaceutical for prevention and/or treatment of diseases referred from EDG-2.

78. The use according to claim 77, wherein the disease referred from EDG-2 is urinary system disease.

79. The use according to claim 77, wherein the disease referred from EDG-2 is carcinoma-associated disease, proliferative disease, inflammation / immune system disease, disease caused by secretory dysfunction or brain-related disease.

80. A pharmaceutical composition for prevention and/or treatment of urinary system disease comprising a combination of an LPA receptor antagonist containing the compound according to claim 1 or a prodrug thereof as an active ingredient and one or two

more agent(s) selected from other LPA receptor antagonist, α1 blocking agent, anticholinergic agent, 5α-reductase inhibitor and/or anti-androgenic agent.